SHARP SERVICE MANUAL

CODE : 00ZXEA402USME

ELECTRIC CASH REGISTER

MODEL XE-A402

CONTENTS

CHAPTER 1. SPECIFICATIONS 1

CHAPTER 2. OPTIONS 4

CHAPTER 3. MASTER RESET AND PROGRAM RESET. 4

CHAPTER 4. HARDWARE DESCRIPTION 5

CHAPTER 5. DIAGNOSTIC PROGRAM 10

CHAPTER 6. IPL FROM EP-ROM 14

CHAPTER 7. CIRCUIT DIAGRAM AND PWB LAYOUT 15

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

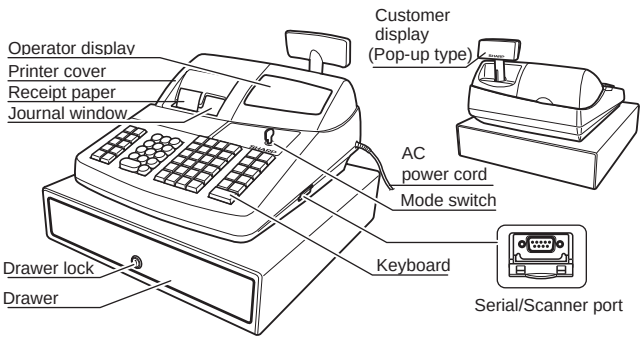
SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

CHAPTER 1. SPECIFICATIONS

1. APPEARANCE

■Front view ■Rear view



2. RATING

Model	XE-A402
Weight	28.0 lb (12.7 kg)
Dimensions	16.6 (W) x 16.9 (D) x 11.7 (H) in. (421 (W) x 429 (D) x 297 (H) mm)
Power source	AC 120V (±10%), 60Hz
Power consumption	Stand-by 10W, Operating 50.4W (max.)
Working temperature	32 °F to 104 °F (0 °C to 40 °C)

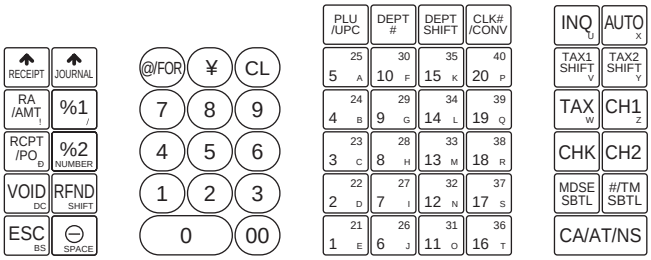
3. KEYBOARD

3-1. KEYBOARD LAYOUT

Type	Normal keyboard
Key position	STD/MAX 59
Key pitch	19 (W) x 19 (H) mm
Key layout	Fixed type

3-2. KEY LIST

■Keyboard layout



Note: The small characters on the bottom or lower right in each key indicates functions or characters which can be used for character entries for text programming.

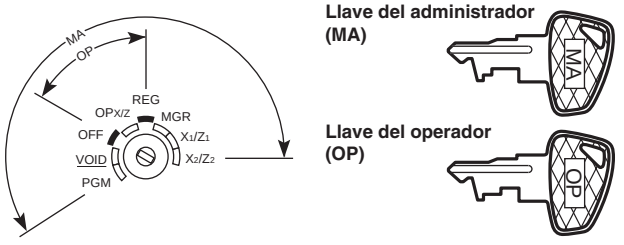
■Key names

KEY TOP	DESCRIPTION
↑ (RECEIPT)	Receipt paper feed key
↑ (JOURNAL)	Journal paper feed key
RA/AMT	Received-on account/Amount key
RCPT/PO	Receipt print/Paid-out key
VOID	Void key
ESC	Escape key
%1, %2	Percent 1and 2 key
RFND	Refund key
⊖	Discount key
@/FOR	Multiplication key
●	Decimal point key
CL	Clear key
00, 0-9	Numeric Keys
PLU/UPC	PLU/UPC key
DEPT#	Department code entry key
DEPT SHIFT	Department shift key
CLK# CONV	Clerk code entry/Conversion key
Dept1-40	Department keys
INQ	Inquiry key
Tax 1 SHIFT, Tax 2 SHIFT	Tax 1 and 2 shift key
AUTO	Automatic sequence key
TAX	Tax key
CHK	Check key
CH1, CH2	Charge 1 and 2 keys
MDSE SBTL	Merchandise subtotal key
#/TM SBTL	Non-add code/Time display/Subtotal key
CA/AT/NS	Total/Amount tender/Non Sale key

4. MODE SWITCH

4-1. LAYOUT

• Rotary type



The mode switch can be operated by inserting one of the two supplied mode keys - manager (MA) and operator (OP) keys. These keys can be inserted or removed only in the “REG” or “OFF” position.

The mode switch has these settings:

OFF: This mode locks all register operations. (AC power turns off.) No change occurs to register data.

OP X/Z: To take individual clerk X or Z reports, and to take flash reports.

It can be used to toggle receipt state “ON” and “OFF” by pressing he [RCP/PO] key.

REG: For entering sales.

PGM: To program various items.

VOID: Enters into the void mode. This mode allows correction after finalizing a transaction.

MGR: For manager’s entries. The manager can use this mode for an override entry.

X1/Z1: To take the X/Z report for various daily totals.

X2/Z2: To take the X/Z report for periodic (weekly or monthly) consolidation.

5. DISPLAY

5-1. OPERATOR DISPLAY

Display device : LCD

Number of line : 2 line

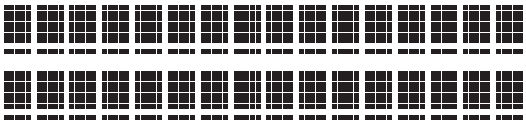
Number of positions : 16 positions

Color of display : Yellow / Green

Character form : Dot matrix

Character size : 14.2 (H) x 7.9 (W) mm

Layout:



5-2. CUSTOMER DISPLAY

Display device : LED

Number of line : 1 line

Number of positions : 7 positions

Color of display : Yellow / Green

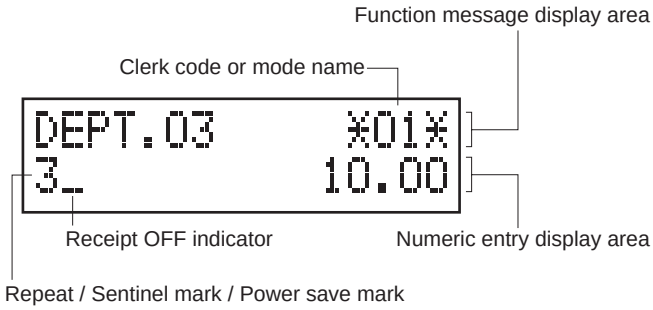
Style : Pop up type

Character form : 7 segment + Dp

Character size : 14.2mm (H) x 7.9mm (W)

Layout:

■Operator display



- Clerk code or Mode name

  The mode you are in is displayed. When a clerk is assigned, the clerk code is displayed in the REG or OP X/Z mode. For example, “*01*” is displayed when clerk 01 is assigned.

- Repeat

  The number of repeats is displayed, starting at “2” and incremental with each repeat. When you have registered ten times, the display will show “0” (2 → 3.....9 → 0 → 1 → 2...)

- Sentinel mark

  When amount in the drawer reaches the amount you preprogrammed, the sentinel mark “X” is displayed to advise you to remove the money and put it in a safe place.

- Power save mark

  When the cash register goes into the power save mode, the power save mark (decimal point) lights up.

- Function message display area

  Item labels of departments and PLU/subdepartments and function texts you use, such as %1, (-) and CASH are displayed.

  When an amount is to be entered or entered, “AMOUNT” is displayed: When an amount is to be entered, ------- is displayed at the numeric entry area with “AMOUNT”. When a preset price has been set, the price is displayed at the numeric entry area with “AMOUNT”.

- Numeric entry display area

  Numbers entered using numeric keys are displayed here.

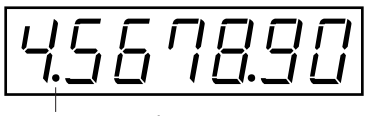
Date and time display

Date and time appear on the display in the OP X/Z, REG, or MGR mode. In the REG or MGR mode, press the [#/TM/SBTL] key to display the date and time.

Error message

When an error occurs, the corresponding error message is displayed in the function message display area.

■Customer display (Pop-up type)



Power save mark
(Lighting the mark only under the power save mode)

6. PRINTER

6-1. PRINTER

- Part number : PR-45M II
- NO. of station : 2 (Receipt and journal)
- Validation : No
- Printing system : Line thermal
- No. of dot : Receipt 288 dots
  Journal 288 dots
- Dot pitch : Horizontal 0.125mm
  Vertical 0.125mm
- Font : 10 dots (W) × 24 dots (H)
- Printing capacity : Receipt max. 24 characters
  Journal max. 24 characters
- Character size : 1.25mm (W) × 3.0mm (H) at 10 × 24 dots
- Print pitch : Column distance 1.5mm
  Row distance 3.75mm
- Print speed : Approximate 50mm/s (13.3 lines/sec)
- Paper feed speed (Manual feed) : Approximate 40mm/s
- Reliability : Mechanism MCBF 5 million lines
  Head life 12.5 million characters
  (at 4 dots/1 character/1 element)
- Paper end sensor : Set up (Receipt and journal)
- Cutter : Manual
- Near end sensor : No

6-2. PAPER

- Paper roll dimension: 44.5 ± 0.5mm in width
  Max. 80mm in diameter
- Paper quality : (Journal/Receipt)
  High-quality paper
  paper thickness: 0.06 to 0.08mm
  Nihon seisi thermal paper : TF50KS-E
  Oji thermal paper : PD150R, PD160R

6-3. LOGO STAMP

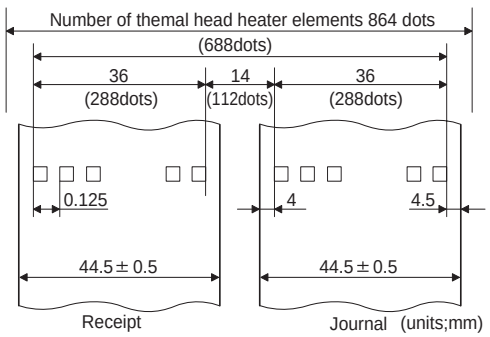
- No

6-4. CUTTER

- Method : Manual

6-5. PRINTING AREA

Receipt & Journal



7. DRAWER

[OUTLINE]

- Standard equipment: Yes
- Max. number of additional drawers: 0
- The drawer consists of:
  1) Drawer box (outer case) and drawer
  2) Coin case (for SEC)
  3) Money case
  4) Lock (attached to the drawer)

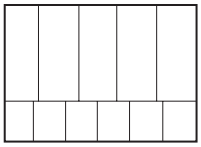
[SPECIFICATION]

7-1. DRAWER BOX AND DRAWER

Model name of the drawer box	SJ423
Size	420 (W) x 427 (D) x 114 (H) mm 16.5 (W) x 16.8 (D) x 4.5 (H) inches
color	Gray (PB-N8.0)
Material	Metal
Bell	–
Release lever	Standard equipment: situated at the bottom
Drawer open sensor	–
Separation from the main unit	–

7-2. MONEY CASE

Separation from the drawer	Allowed
Separation of the bill compartments from the coin compartments	Allowed
Bill separator	Disallowed
Number of compartments	5B/6C



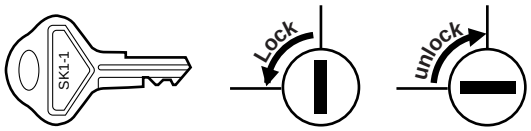
5B/6C

7-3. LOCK (LOCK KEY : LKGIM7331BHZZ)

- Location of the lock: Front
- Method of locking and unlocking:

  To lock, insert the drawer lock key into the lock and turn it 90 degrees counter clockwise.
  To unlock, insert the drawer lock key and turn it 90 degrees clockwise.

- Key No: SK1-1



8. BATTERY

8-1. MEMORY BACK UP BATTERY

Built-in battery: Rechargeable batteries, memory holding time about 1 month (with fully charged built-in batteries, at room temperature)

9. SCANNER

Barcode CCD Scanner an RS-232 interface.
This scanner is the handy barcode reader which can automatic-discriminate various barcodes and can read them, and is equipped with the RS-232 communication interface.

[SPECIFICATRIONS]

Light source	: 660nm visble red LED with focus light bar	
Sensor	: 2088 Pixels CCD arrays	
Operating Voltage	: +5V DC ± 5%	
Readable barcodes	: EAN 8, EAN 13, UPC-A, UPC-E, CODABAR, STANDARD 2 OF 5, CODE39, CODE93, CODE128, INTERLEAVED 2 OF 5	..... (P)
Weight	: 120g ± 5g (without cable)	..... (P)
Cable	: 210cm in length, straight	..... (P)
Interface	: RS-232 serial port interface	
Connector	: DSUB 9 pin 1 pin - RTS 2 pin - TXD 3 pin - RXD 4 pin - (4-6pin short) 5 pin - SG (Signal GND) 6 pin - (4-6pin short) 7 pin - CTS 8 pin - N.C. 9 pin - +5V	

CHAPTER 2. OPTIONS

1. OPTIONS (NO)

2. SERVICE OPTIONS (NO)

3. SUPPLIES

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	Thermal roll paper	TPAPR6645RC05	BA	5 ROLLS/PACK

4. SPECIAL SERVICE TOOLS

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	RS-232 Loop-back connector	UKŌG−6705RCZZ	BU	

CHAPTER 3. MASTER RESET AND PROGRAM RESET

1. MASTER RESETTING

Master resetting clears the entire memory and resumes initial values.

Master resetting can be accomplished by using the following procedure:

Procedure A:
1) Unplug the AC cord from the wall outlet.
2) Set the mode switch to the PGM position.
3) While holding down both the JOURNAL FEED key and [CL] key, plugin the AC cord to the wall outlet.

The master reset can also be accomplished in the following case.

In case power failure occurs when the machine has no battery attached to it, the master reset operation is automatically performed after the power has been restored.

(This is because if power failure occurs with no battery attached to the machine, all the memories are lost and the machine does not work properly after power recovery; this requires the master reset operation.)

2. PROGRAM RESETTING (INITIALIZATION)

This resetting resumes the initial program without clearing memory.

This resetting can be operated at below sequence in PGM mode.

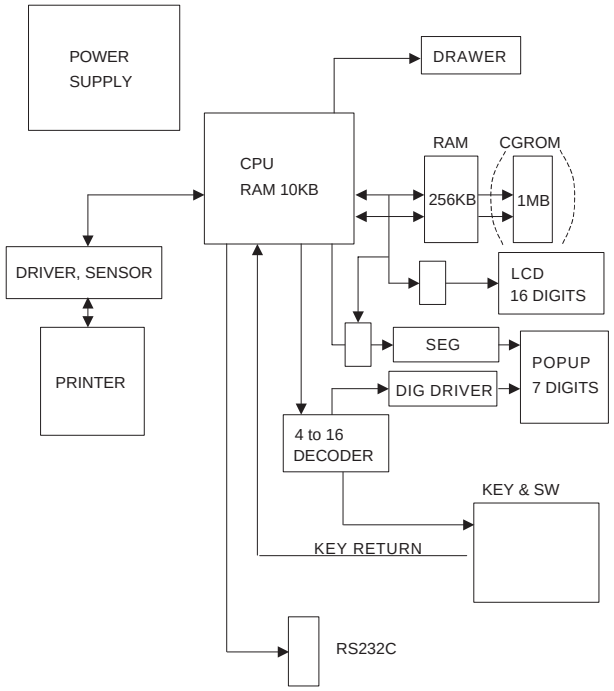
Procedure:
1) Unplug the AC cord from the wall outlet.
2) Set the mode switch to the PGM position.
3) While holding down both JOURNAL FEED key and RECEIPT FEED key, plugin the AC cord to the wall outlet.

Note: In case power failure occurs when the machine has no battery attached to it, the master reset operation is automatically performed after the power has been restored.

CHAPTER 4. HARDWARE DESCRIPTION

1. BLOCK DIAGRAM

XE-A401



CPU

MITSUBISHI M30620SAFP
(INTERNAL RAM 10KB)

EXTERNAL MEMORY

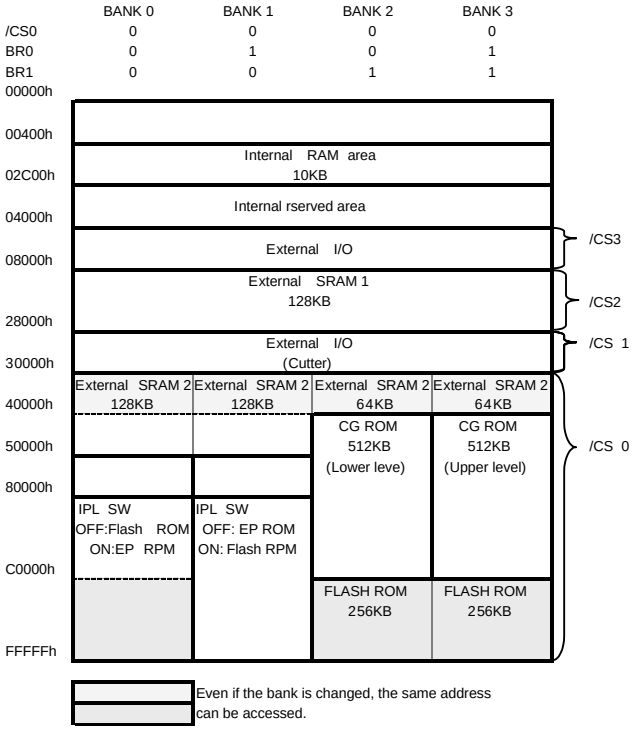
RAM	256KB
FLASH ROM	512KB
	SHARP LH28F004BVT
CGROM	1MB (for Japanese market only)

PRINTER

PR45M

2. MEMORY MAP

2-1. ADDRESS MAP



Only the /CS0 area (30000h ~ FFFFFh) in the bank is valid.

2-2. EXTERNAL BUS

External BUS ACCESS SPEED

SRAM/EPROM/FLASH ROM ; 2 BCLK
CGROM ; 3 BCLK
External I/O ; 1 BCLK ∗1BCLK = 83.3ns (at 12MHz)

SRAM
/CS2 area
address 08000h ~ 27FFFh 128KB
Same as ER-A235P
/CS0 area BANK 0
address 30000h ~ 4FFFFh 128KB

FLASH ROM
/CS0 area BANK 0
address 80000h ~ FFFFFh 256KB
(Moves to Bank 1 when rewritten using EPROM)

CGROM
/CS0 area BANK 2, 3
address 40000h ~ BFFFFh (512KB x 2)

I/O

∗ CGROM is available only for the Japanese market.

3. PRINTER CONTROL

3-1. STEPPING MOTOR CONTROL

The stepping motor is driven at a constant voltage by Sanken STA471A.

1step: 0.125mm, A1dot: 1step

Printing speed 50mm/s

< CPU's PORT >

No.	CPU PORT	Signal to be used
80	P10	RAS
79	P11	RBS
78	P12	RCS
77	P13	RDS
76	P14	JAS
75	P15	JBS
74	P16	JCS
73	P17	JDS

< Driving steps >

RECEIPT MOTOR

	Driver IC input (CPU output)				Motor driving signal			
STEP	RAS	RBS	RCS	RDS	/RPFA	/RPFB	/RPFC	/RPFD
1	H	L	L	H	L	H	H	L
2	L	H	L	H	H	L	H	L
3	L	H	H	L	H	L	L	H
4	H	L	H	L	L	H	L	H

	Driver IC input (CPU output)				Motor driving signal			
STEP	JAS	JBS	JCS	JDS	/JPFA	/JPFB	/JPFC	/JPFD
1	L	H	H	L	H	L	L	H
2	L	H	L	H	H	L	H	L
3	H	L	L	H	L	H	H	L
4	H	L	H	L	L	H	L	H

∗When the motor is at rest, the same phase as the final excitation phase is RUSH energize for 10 ms to turn off all phases. → Turn all RAS ~ RDS and JAS ~ JDS into L.

No energizing should be allowed at lease 30 ms after stopping the motor before restarting.

When starting the motor, the first excitation phase is RUSH energized for 10 ms to start the motor.

3-2. HEAD CONTROL

HEAD:832 dots in all. Printable range: 384 dots at receipt side; 384 dots at journal side

Related PORT

No.	CPU PORT	Signal to be used
30	TXD2	SO
29	RXD2	SI
28	CLK2	PCLK
93	P103	/STRB1
92	P104	/STRB2
91	P105	/STRB3
90	P106	/STRB4
89	P107	LATCH
21	P81	VHCOM

/STB1: 1 ~ 288dot: 288 dots in all
/STB2: 289 ~ 432dot: 144 dots in all
/STB3: 433 ~ 576dot: 144 dots in all
/STB4: 577 ~ 864dot: 288 dots in all
Total 864 dots

∗When turning on or off the printer power supply, make sure to turn /STB1, 2, 3, 4 to "H".

∗Do not turn on without paper.

∗THERMAL HEAD power supply control : Turns ON when P81= "H"; turns OFF when "L". (The power supply for HEAD and STEPPING MOTOR is shared). When printing is finished (when the motor is stopped) Athe power should be turned OFF.

∗Before printing or feeding paper, perform A/D conversion in ∗∗ ms after the printer head is turned ON and make sure the voltage is stable.
(The power supply of the printer head should be turned ON and OFF by using the regulator IC.)

4. I/O

M16C/24 PORT MEMORY SPACE: NORMAL MODE
PROCESSOR MODE: MICRO PROCESSOR MODE
It is used by (SEPARATE BUS 8bit Width)

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function	PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P00	88	I/O		D0		Out L		P54	42	O	/HLDA	(NU)		Out L	
P01	87	I/O	D1	D1		Out L		P55	41	I	/HOLD	/HOLD		In	
P02	86	I/O	D2	D2		Out L		P56	40	O	ALE	(NU)		Out L	
P03	85	I/O	D3	D3		Out L		P57	39	I	/RDY	/RDY		In	
P04	84	I/O	D4	D4		Out L		P60	38	O	P60	DR1	L	Out L	DRAWER 1 DRIVE SIGNAL
P05	83	I/O	D5	D5		Out L		P61	37	O	CLK0	FSCK(NU)	L	Out L	FMC FSCK
P06	82	I/O	D6	D6		Out L		P62	36	I	RXD0	FRD(NU)	L	Out L	FMC FRD
P07	81	I/O	D7	D7		Out L		P63	35	O	TXD0	FSD (NU)	L	Out L	FMC FSD
P10	80	O	P10	RAS	L	Out L	RECEIPT PAPER FEED A	P64	34	O	/RTS1	/RS	H	Out L	RS-232 /RS
P11	79	O	P11	RBS	L	Out L	RECEIPT PAPER FEED B	P65	33	O	P65	/FRES(NU)	L	Out L	FMC /FRES
P12	78	O	P12	RCS	L	Out L	RECEIPT PAPER FEED C	P66	32	I	RXD1	RD		In	RS-232 RD
P13	77	O	P13	RDS	L	Out L	RECEIPT PAPER FEED D	P67	31	O	TXD1	SD	H	Out L	RS-232 SD
P14	76	O	P14	JAS	L	Out L	JOURNAL PAPER FEED A	P70	30	O	TXD2	SO	L	Out L	PRINTER DATA OUT
P15	75	O	P15	JBS	L	Out L	JOURNAL PAPER FEED B	P71	29	I	RXD2	SI		In	PRINTER DATA IN
P16	74	O	P16	JCS	L	Out L	JOURNAL PAPER FEED C	P72	28	O	CLK2	PCLK	L	Out L	PRINTER CLOCK
P17	73	O	P17	JDS	L	Out L	JOURNAL PAPER FEED D	P73	27	O	P73	DR2	L	Out L	DRAWER 2 DRIVE SIGNAL
P20	72	O	A0	A0		Out L		P74	26	O	P74	/ER	H	Out L	RS-232 /ER
P21	71	O	A1	A1		Out L		P75	25	I	P75	/CD		In	RS-232 /CD
P22	70	O	A2	A2		Out L		P76	24	I	P76	/CS		In	RS-232 /CS
P23	69	O	A3	A3		Out L		P77	23	I	P77	/DR		In	RS-232 /DR
P24	68	O	A4	A4		Out L		P80	22	O	P80	BUZZER	L	Out L	
P25	67	O	A5	A5		Out L		P81	21	O	P81	VHCOM	L	In	PRINTER HEAD CONTROL
P26	66	O	A6	A6		Out L		P82	20	I	/INT0	POFF		In	
P27	65	O	A7	A7		Out L		P83	19	I	/INT1	/FRDY(NU)	L	Out L	FMC /FRDY
P30	63	O	A8	A8		Out L		P84	18	O	P84	/BUSY(NU)	L	Out L	FMC #BUSY
P31	61	O	A9	A9		Out L		P85	17	I	/NMI	/NMI(NU)		In	
P32	60	O	A10	A10		Out L		P86	11	O	XCOUT	XCOUT			32.768kHz
P33	59	O	A11	A11		Out L		P87	10	I	XCIN	XCIN			32.768kHz
P34	58	O	A12	A12		Out L		P90	7	I	P90	MODE		In	MODE KEY SENSE
P35	57	O	A13	A13		Out L		P91	6	I	P91	MSENS		In	MISCELLANEOUS SENSE
P36	56	O	A14	A14		Out L		P92	5	O	P92	BA1	L	Out L	BANK signal 1
P37	55	O	A15	A15		Out L		P93	4	O	P93	BA0	L	Out L	BANK signal 0
P40	54	O	A16	A16		Out L		P94	3	O	P94	DATA /CE	L	Out L	LCD DATA LATCH signal
P41	53	O	A17	A17		Out L		P95	2	O	P95	BLON	L	Out L	BACK LIGHT ON
P42	52	O	A18	A18		Out L		P96	1	O	P96	LCDON	L	Out L	LCD POWER ON
P43	51	O	A19	A19		Out L		P97	100	I	P97	IPLON		In	IPL ON signal
P44	50	O	/CS0	/CS0		Out H		P100	97	I	AN0	TM		In	HEAD temperature monitor
P45	49	O	/CS1	/CS1		Out L		P101	95	I	AN1	VPTEST		In	HEAD voltage monitor
P46	48	O	/CS2	/CS2		Out H		P102	94	I	AN2	VREF		In	Referance voltage
P47	47	O	/CS3	/CS3		Out L		P103	93	O	AN3	/STRB1	H	In	PRINTER STORE SIGNAL 1
P50	46	O	/WR	/WR		Out L		P104	92	O	AN4	/STRB2	H	In	PRINTER STORE SIGNAL 2
P51	45	O	/BHE	(NU)		Out L		P105	91	O	P105	/STRB3	H	In	PRINTER STORE SIGNAL 3
P52	44	O	/RD	/RD		Out L		P106	90	O	P106	/STRB4	H	In	PRINTER STORE SIGNAL 4
P53	43	O	BCLK	BCLK		Out L		P107	89	O	P107	LATCH	L	In	PRINTER LATCH SIGNAL

Power supply/CONTROL pins

PORT	PIN No.	I/O	Pin name	Function	PORT	PIN No.	I/O	Pin name	Function
BYTE	8	I	BYTE	Connected to VCC	Vcc	62		Vcc	Connected to VCC
CNVss	9	I	CNVss	Connected to GND	Vss	64		Vss	connected to GND
/RESET	12	I	/RESET		AVss	96		AVss	Connected to GND
Xout	13	O	Xout	OPEN	Vref	98		Vref	Connected to VCC
Vss	14		Vss	Connected to GND	AVcc	99		AVcc	Connected to VCC
Xin	15	I	Xin	connected to Spectram diffusion IC					
Vcc	16		Vcc	Connected to VCC					

5. KEY-DISPLAY

5-1. LCD CONTROL

Basically the same as the ER-A275P.

LCD-related registers

Function	Address	R/W
LCD Write Data	04001h	W
LCD Read Data	04002h	R
LCD Control Signal / Key Strobe Signal	04003h	W
Data Latch Signal	CPU port P94	W

< LCD Control Signal / Key Strobe Signal >

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	–	E	R/W	RS	KS3	KS2	KS1	KS0

Bit7 : Not used

Bit6 : E
Enable Signal ┘‾└ Enable

Bit5 : R/W
H : Data read L : Data Write

Bit4 : RS
H : Data input L : Instruction Input

< Data Latch Signal >

L : LCD write data latch

5-2. KEY/DISPLAY SCAN

On the A401, the key and display scan signal is common.

KEY/display SCAN and key read should be performed at the following timing.

① KEY/display SCAN cycle: 10ms

② Blanking time: 50us

③ KEY DATA READ timing: More than 10 ms from the fall of the SCAN signal

Key / Display-related registers

Function	Address	R/W
LED Segment Signal	04000h	W
LCD Control Signal / Key Strobe Signal	04003h	W
Key Return Signal	04003h	R

< LED Segment Signal >

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	dp	g	f	e	d	c	b	a

< LCD Control Signal / Key Strobe Signal >

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	-	E	R/W	RS	KS3	KS2	KS1	KS0

Bit3 ~ 0 : KS3 ~ 0

Strobe signals for keys and POP UP Display are generated at KS3 - 0.

< Key Return Signal >

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	KR7	KR6	KR5	KR4	KR3	KR2	KR1	KR0

5-3. KEYSCAN MATRIX

PENDING

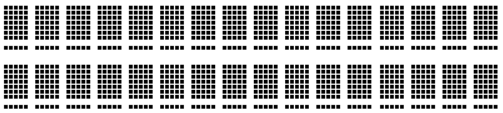
Others

	CPU	STO	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9
MODE	P90	SRV	PGM		Time	REG	MGR	X1/Z1	X2/Z2		
Others	P91	PF-R	PF-J	RPE	HEAD UP	JPE		DRAWER OPEN	MRS	RS/CI	

5-4. DISPLAY (PENDING)

The A401 has an LCD display, 5 x 7 dots, 2 lines, at the front side and a 7-digit LED at the pop-up side.

FRONT:



POP UP:

- Display DIGIT signal

  The above ST0 ~ ST6 are display digit signals.

  ST0: 1st digit ~ ST6: 7th digit

- Display SEGMENT signal

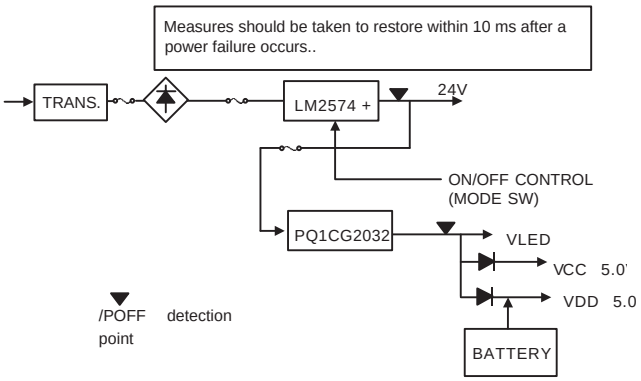
  The LED segment signal is outputted by writing SEGMENT data in the /CS3 space.

  Correspondence of DATA ~ SEGMENT

  D0 ~ D6 → A ~ g

  D7 → DP

6. POWER SUPPLY



7. REWRITING FLASH MEMORY

IPL from EP-ROM: After IPL SW is set to ONA the program is started from EP-ROM by turning on the power.
The program on EP-ROM is transferred to flash ROM by switching the banks through S-RAM.

IPL from COM: Data from the PC is written to flash ROM through the COM port. (Max. 38.4 kbps)

8. DRAWER

The A401 has a 1 channel of drawer port. (+ 1 channel is reserved for the CPU PORT) O R No open sensor is provided.

The driving time for the DRAWER solenoid are as follows: 50ms (max) 45ms (min)

9. PRINT RATE

384 dots/1 line

10. A/D CONVERSION

The printer power supply voltage should be measured at more than 10 ms after the printer is turned ON.

11. BUZZER

PIEZO type BUZZER

The oscillating frequency is 4.0kHz ± 0.5kHz

12. RESET

The RESET signal is generated when:

1) The mode key switch is turned from SRV to a position other than SRV'(excluding OFF).
2) The power is turned ON more than 10 seconds after the power is turned OFF. (The reset signal may not be issued if the POWER-OFF time is short.)
3) The mode key switch is turned from OFF to a position other than OF (excluding the SRV position). (If the power-off time is less than 5 seconds, the reset signal may not be issued.)

CHAPTER 5. DIAGNOSTIC PROGRAM

1. TEST ITEMS

The test items are as follows:

	Code	Description
1)	100	Display buzzer test
2)	101	Key code
3)	102	Printer test
4)	104	Keyboard test
5)	105	Mode switch test
6)	106	Printer sensor test
7)	107	Clock display test
8)	110	Drawer 1 open & sensor test
9)	120	External RAM test
10)	121	CPU internal RAM test
11)	130	FLASH ROM test
12)	160	AD conversion port test
13)	500	RS232C test

∗Starting DIAG.

Mode switch: PGM
Key operation: Above code + “PO” key

2. DESCRIPTION OF EACH DIAG PROGRAM

1) DISPLAY BUZZER TEST

① Key operation

100 → RCPT/PO

② Test procedure

OP display

D	I	S	P		B	U	Z	Z	E	R		P	G	M	
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Rear display 4.5.6.7.8.9.0.

The decimal point on the LED and the cursor on the LCD will shift from the lower digit to the upper digit in steps of 1 digit (every 200 msec)
After that, all segments will turn on (about 1 sec)
These two modes are repeated.
At the same time, the buzzer sounds continuously.

③ Check that:

A) Each position is correctly displayed.

B) The brightness of each number is uniform.

C) The buzzer sound is normal.

④ End of testing

You can exit the test mode by pressing any key. The following is printed.

1 0 0

2) KEY CODE

① Key operation

101 → RCPT/PO

② Test procedure

OP display

K	E	Y		C	O	D	E					P	G	M	
													○	○	○

KEY CODE

③ Check that:

KEY code : Every time a key is pressed, the hard code of that key is displayed as a decimal number.
When a key is pressed twice or pressed in an incorrect manner, --- will be displayed.

④ End of testing

You can exit the test mode by turning the mode switch to a position other than the PGM mode. The printer prints as follows:

1 0 1

3) PRINTER TEST

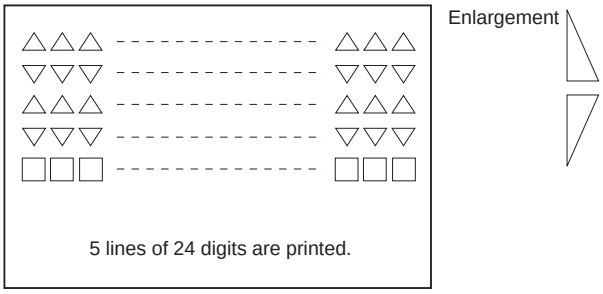
① Key operation

102 → RCPT/PO

② Test procedure

OP display

R	/	J		P	R	I	N	T	E	R		P	G	M	



At the receipt side, the logo is also printed and the receipt is issued.

③ Check that:

The print is free from contamination, blur, and uneven density.

④ End of testing

The test will end automatically.

4) KEYBOARD TEST

① Key operation

____104 → RCPT/PO

↑

KEY check sum code

② Test procedure

The keyboard is checked using the sum check code of the key code.

If the sum check code is not entered, the check is made using the sum check code of the default keyboard arrangement

The sum check data for each model is entered to the front 4 digits of the DIAG code, and that data is compared with the key data added until the final key (CA/AT) is pressed.

Both data are the same, the test ends, printing the number given below.

If both data are different, the printer prints the error message.

OP display

K	E	Y		B	O	A	R	D				P	G	M	
1	0	4											○	○	○

KEY CODE

③ Check:

A) The content of completion print

④ End of testing

When the test ends normally: **1 0 4**

When an error occurs: E – ~ – **1 0 4**

Note: Calculation of key sum check data

Hard codes (hexadecimal number) at the position (excluding feed key) where there is an input data contact are added.

However, the end key (TL) is not added.

This data to which hard codes have been added is converted into a decimal number value, which will become the sum check data that will be entered when DIAG is started.

5) MODE SWITCH TEST

① Key operation

105 → RCPT/PO

② Test procedure

OP display

M	O	D	E		S	W					P	G	M	
1	0	5												X

MODE: PGM_VOID_OFF_OP X/Z_REG_MGR_X1/Z1_X2/Z2__PGM

X : 1 2 9 3 4 5 6 7 1

The above X must be read in the correct order. (If the contact is open, 9 will be displayed.)

③ Check:

The display during testing and the content of the completion print.

④ End of testing

When the test ends normally **1 0 5**

When an error occurs: E – ~ – **1 0 5**

6) PRINTER SENSOR TEST

① Key operation

106 → RCPT/PO

② Test procedure

Check the status of the paper end sensor and head up sensor.

OP display

R	/	J		S	E	N	S	O	R			P	G	M	
1	0	6											X	–	Y

③ Check the following.

X: 1 - Paper present at the receipt side
O - No paper at the receipt side

Y: 1 - Paper present at the journal side
O - No paper at the journal side

④ End of testing

You can exit the test mode by pressing any key and the printer prints the following.

1 0 6

7) CLOCK TEST

① Key operation

107 → RCPT/PO

② Test procedure

OP display

T	I	M	E	R		C	H	E	C	K		P	G	M	
1	0	4						*	*	–	*	*		*	*

Hour Min. Sec.

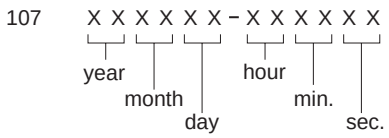
Blinks at an interval of 0.5 sec.

③ Check that:

"–" blinks and the clock counts up.

④ End of testing

When any key is pressed, the date and time are printed and the test mode will be terminated.



8) DRAWER 1 OPEN & SENSOR TEST

① Key operation

110 → RCPT/PO

② Test procedure

OP display

D	R	A	W	E	R		1					P	G	M	
															X

X : O = DRAWER OPENED
C = DRAWER CLOSED

③ Check that:

A) The drawer 1 opens normally.

B) The sensor correctly indicates the status of the drawer 1.

∗ On the XE-A401, “C” (CLOSED) is always displayed.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 0

9) EXTERNAL RAM TEST

① Key operation

120 → RCPT/PO

② Test procedure

The standard 256 Kbyte RAM is checked.

The contents of memory must be stored before and after this test.

RAM (08000H ~ 27FFFH area and 40000H ~ 5FFFFH area) is tested in the following procedure:

a) Store data in the test areas
b) Write “00H”
c) Read and compare “00H” and then write”55H”
d) Read and compare “55H” and then write “AAH”
e) Read and compare “AAH”
f) Restore stored data

If an error occurs at a step, the error is printed.

If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

10000H , 10001H , 10002H , 10004H , 10008H ,
10010H , 10020H , 10040H , 10080H ,
10100H , 10200H , 10400H , 10800H ,
11000H , 12000H , 14000H , 18000H ,
20000H
40000H , 40001H , 40002H , 40004H , 40008H ,
40010H , 40020H , 40040H , 40080H ,
40100H , 40200H , 40400H , 40800H ,
41000H , 42000H , 44000H , 48000H ,
50000H

OP display

R	A	M									P	G	M	
1	2	0												

③ Check:

A) The completion print.

④ End of testing

The program ends after printing as follows:

When the test ends normally: 120
When the test end abnormally: Ex – ~ – 120
∗∗∗∗∗
x = 1:Data error
x = 2:Address error

When an error occurs, the printer outputs the error message and the address where the error has occurred in the area ∗∗∗∗∗.

10) CPU INTERNAL RAM TEST

① Key operation

121 → RCPT/PO

② Test procedure

The test program tests internal RAM (10 Kbytes) of the CPU.

The contents of memory must be stored before and after this test.

RAM (00400H ~ 02BFFH area) is tested in the following procedure.

a) Store data in the test area.
b) Write “00H”
c) Read and compare “00H” and then write “55H”
d) Read and compare “55H” and then write “AAH”
e) Read and compare “AAH”
f) Restore stored data

If an error occurs at a step, the error is printed.
If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

01000H , 01001H , 01002H , 01004H , 01008H
01010H , 01020H , 01040H , 01080H ,
01100H , 01200H , 01400H , 01800H ,
02000H

OP display

C	P	U		R	A	M					P	G	M	
1	2	1												

③ Check:

The completion print.

④ End of testing

The test program ends after printing.

When the test ends normally: 121
When the test ends abnormally: Ex – ~ – 121
∗∗∗∗∗
x = 1:Data error
x = 2:Address error

If an error occurs, the printer outputs the error message and the address where the error has occurred in the area ∗∗∗∗∗.

11) FLASH ROM TEST

① Key operation

130 → RCPT/PO

② Test procedure

The test program checks that the checksum of the flash ROM (BANK0F80000H ~ FFFFFH).

The lower two digits of the checksum should be 10H. (pending)

OP display

F	L	A	S	H		R	O	M				P	G	M	
1	3	0													

③ Check:

The completion print.

④ End of testing

The test will automatically be terminated and the printer prints as follows:

When the test ends normally:		130
	ROM	******** (Model name)
		******** (Version)
When the test ends abnormally:	E – – ~ – –	130
	ROM	******** (Model name)
		******** (Version)

12) AD CONVERSION PORT TEST

① Key operation

160 → RCPT/PO

② Test procedure

The test program displays the voltage of each AD conversion port.

Display

OP display

T	M					=	*	*	*	*		P	G	M	
1	6	0													

↓

OP display

V	R	F				=	*	*	*	*		P	G	M	
1	6	0													

↓

OP display

V	P	T	E	S	T	=	*	*	*	*		P	G	M	
1	6	0													

↓

End of testing

13) RS232C TEST

Install the RS232C loopback connector.

① Key operation

500 → RCPT/PO

② Test procedure

The test program checks the control signals.

OUTPUT		INPUT			
/ER	/RS	/DR	/CI	/CD	/CS
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	ON	ON
ON	OFF	ON	ON	OFF	OFF
ON	ON	ON	ON	ON	ON

Data communication check

A loopback test of 256-byte data between is performed.

DATA: $00 - $FF BAUD RATE :9600 BPS

OP display

R	S	2	3	2	C		T	E	S	T		P	G	M	
5	0	0													

③ Check:

The completion print.

④ End of testing

Completion print	RS TEST	OK
Error print	RS TEST	**NG**ERxx

xx	Contents of error	
01	ER DR error	
02	ER CI error	
03	RS CD error	
04	RS CD error	
05	SD RD error	DATA error
06	SD RD error	DATA error/framing error

3. KEY CODE TABLE

XE–A401U

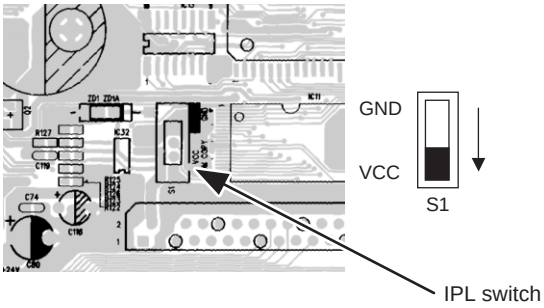
					083	067	147	148			
↑ RF	↑ JF				084	068	146	018			
033	037	052	132	116	082	066	149	145	003	004	
032	048	050	130	114	085	069	065	064	002	005	
038	054	053	133	117	081	080	086	070	017	001	
039	055	128	129	113	102	103	087	071	016	000	
		118		112					022	006	
									007		

CHECK SUM : 4 0 7 5

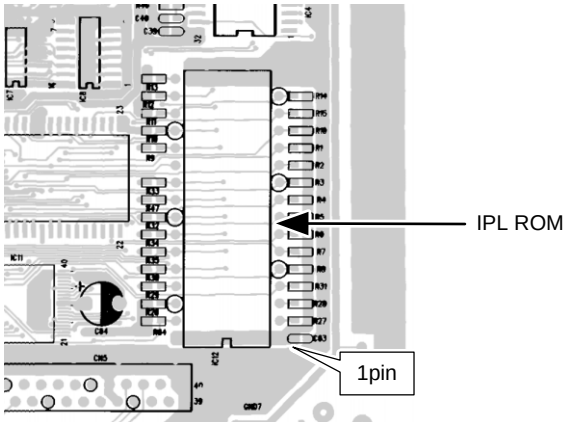
CHAPTER 6. IPL FROM EP-ROM

Before working on the installation, unplug the AC cord from the AC outlet.

1. Open the top cabinet.
2. Set the IPL switch (S1) to VCC position.



3. Install the IPL ROM to the IC socket of the MAIN PWB.

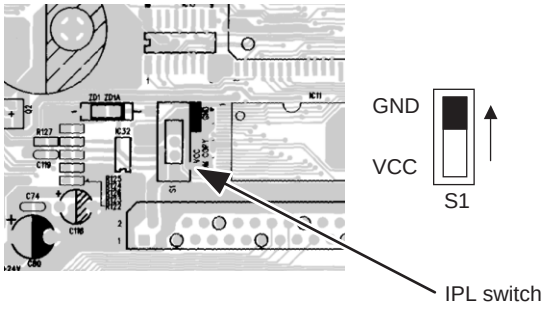


4. Turn the mode key switch to PGM position, and insert AC plug in AC outlet.
5. The IPL procedure is started.

   When the procedure is completed, the message of “Completed.” Is shown.

```
P-ROM  COPY
Completed.
```

6. Unplug the AC cord from the AC outlet.
7. Remove the IPL ROM to the IC socket of the MAIN PWB.
8. Set the IPL switch (S1) to GND position.



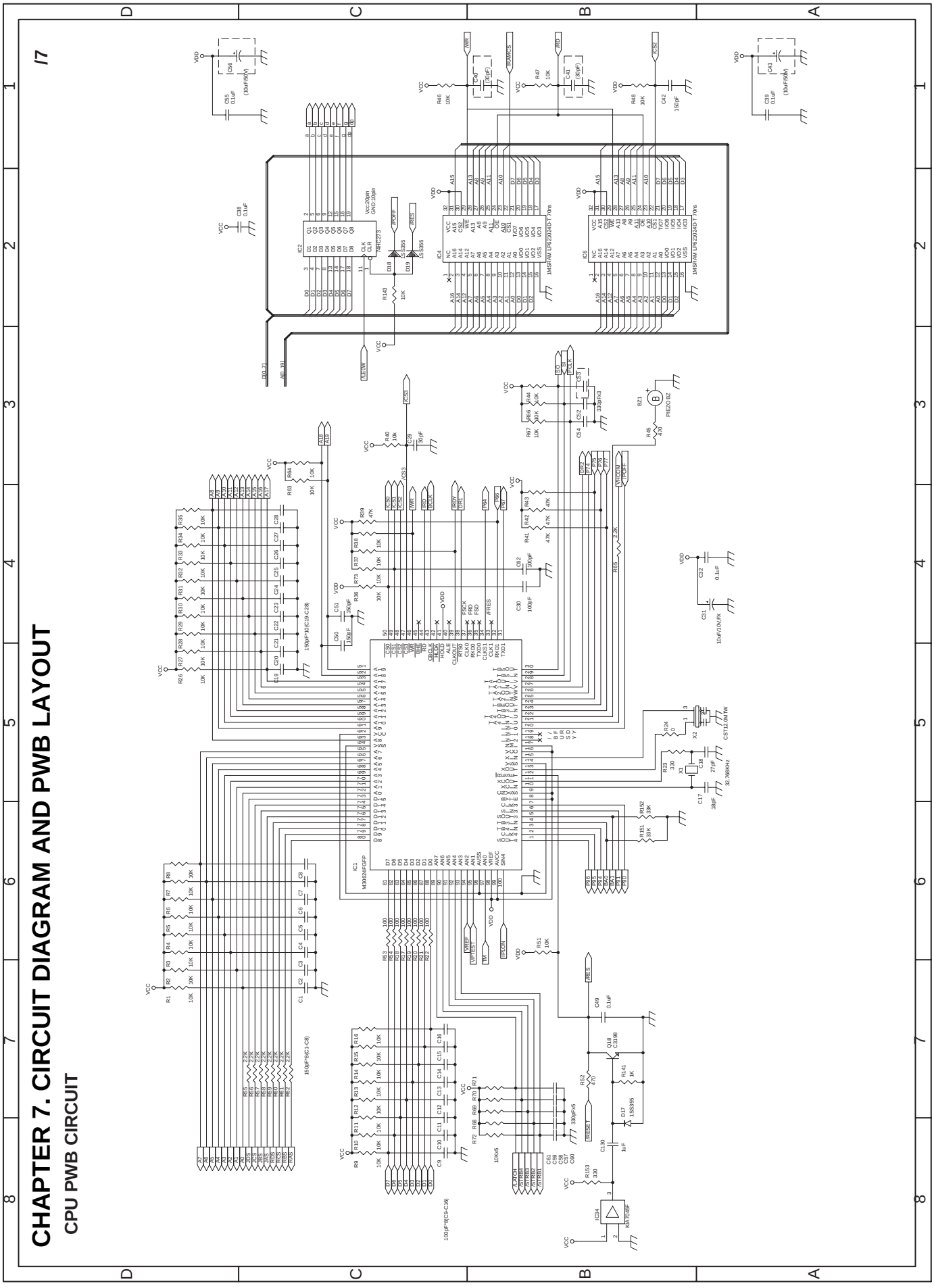
9. Replace the top cabinet.
10. Perform a master reset.

    While holding down Journal feed key and CL key, insert AC cord in AC outlet.

```
*** MRS. ***
```

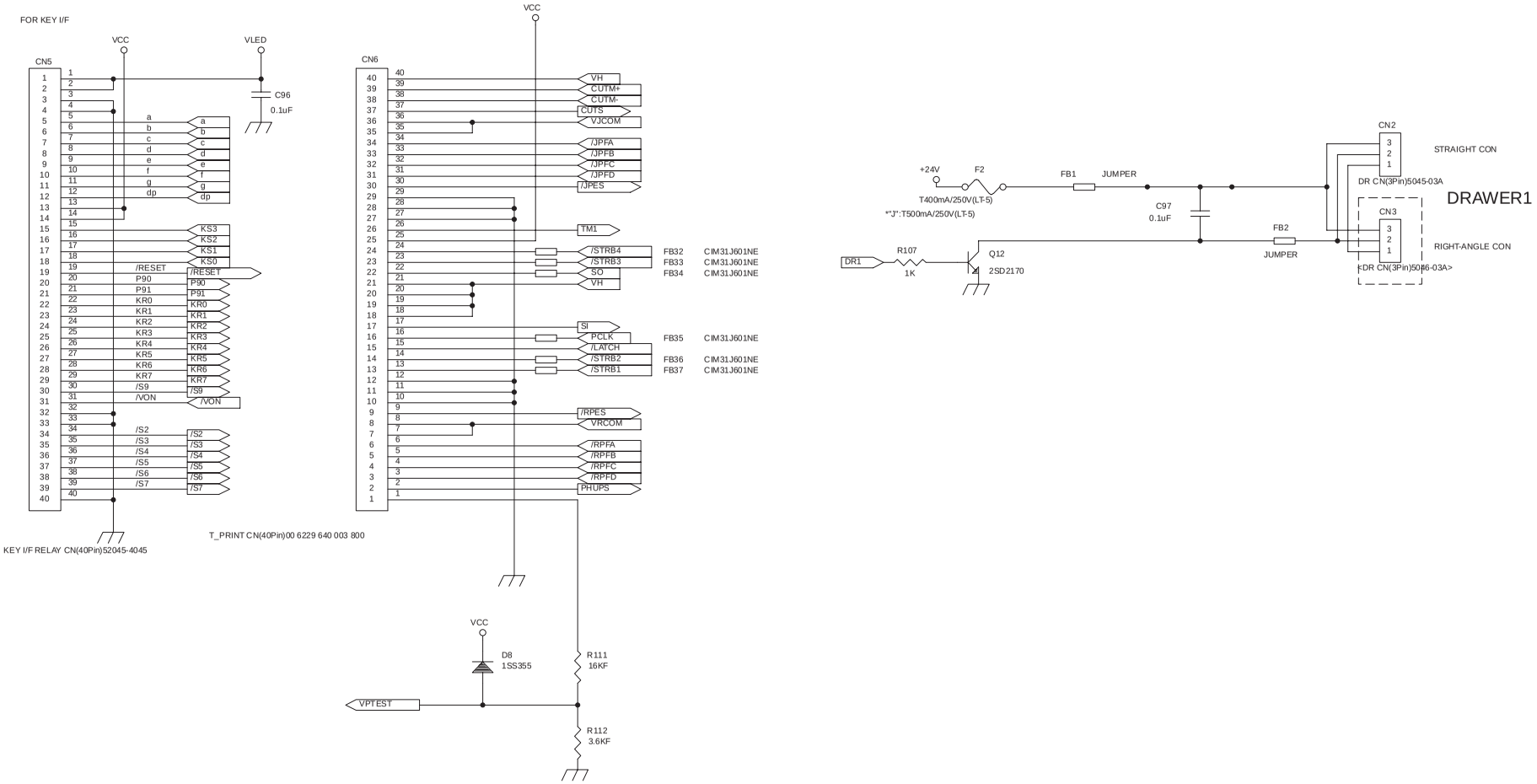
CHAPTER 7. CIRCUIT DIAGRAM AND PWB LAYOUT

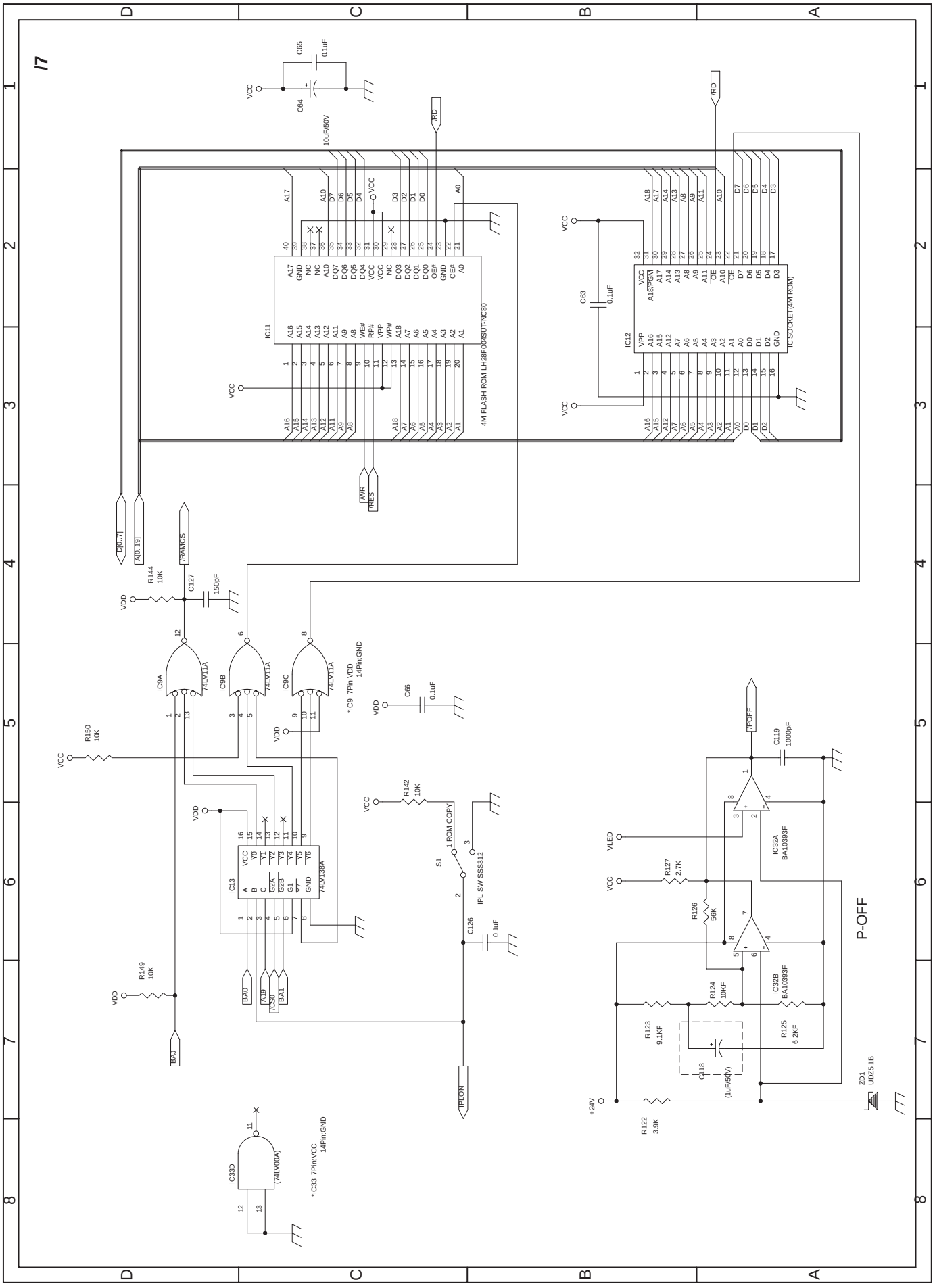
CPU PWB CIRCUIT

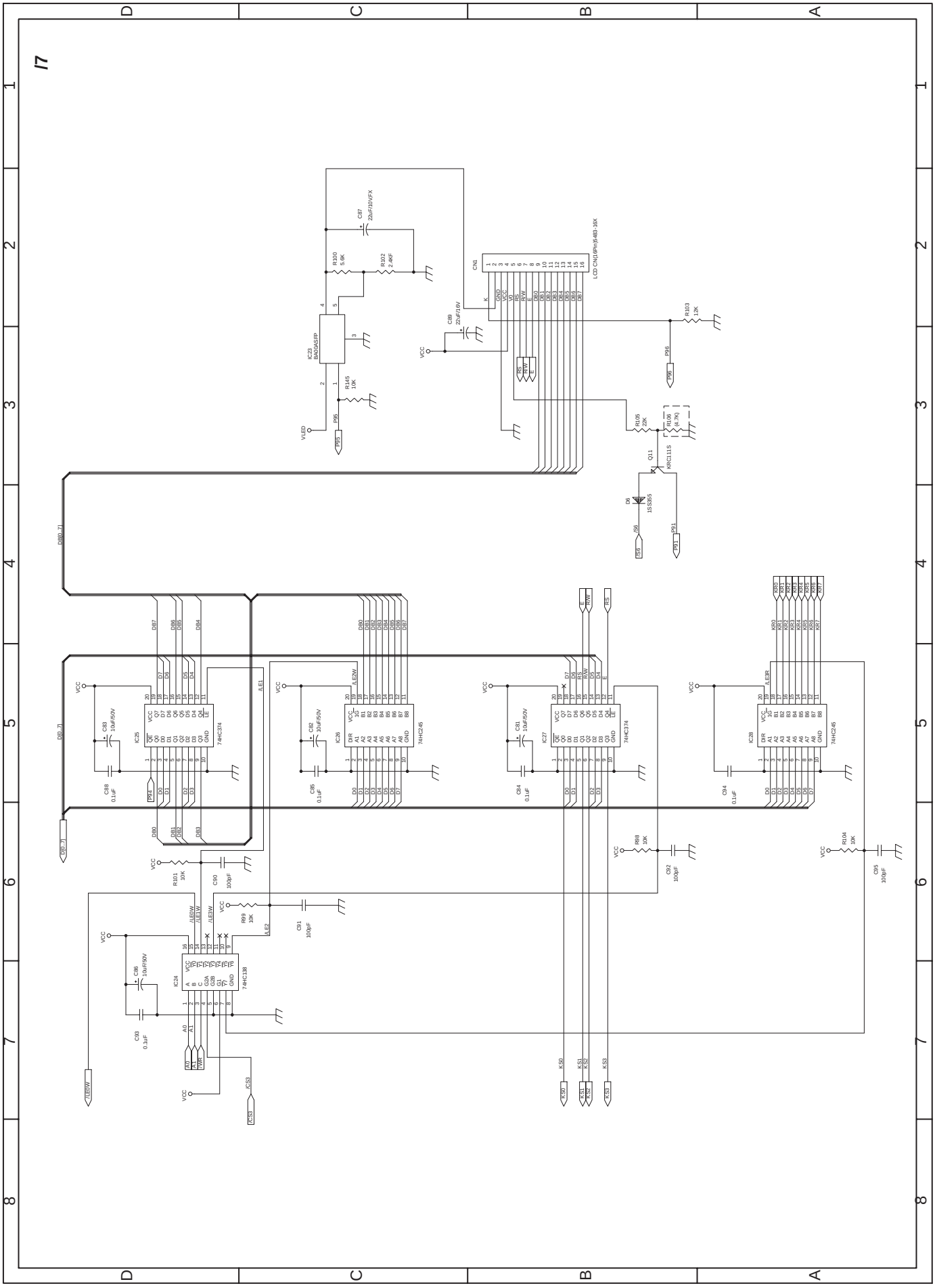


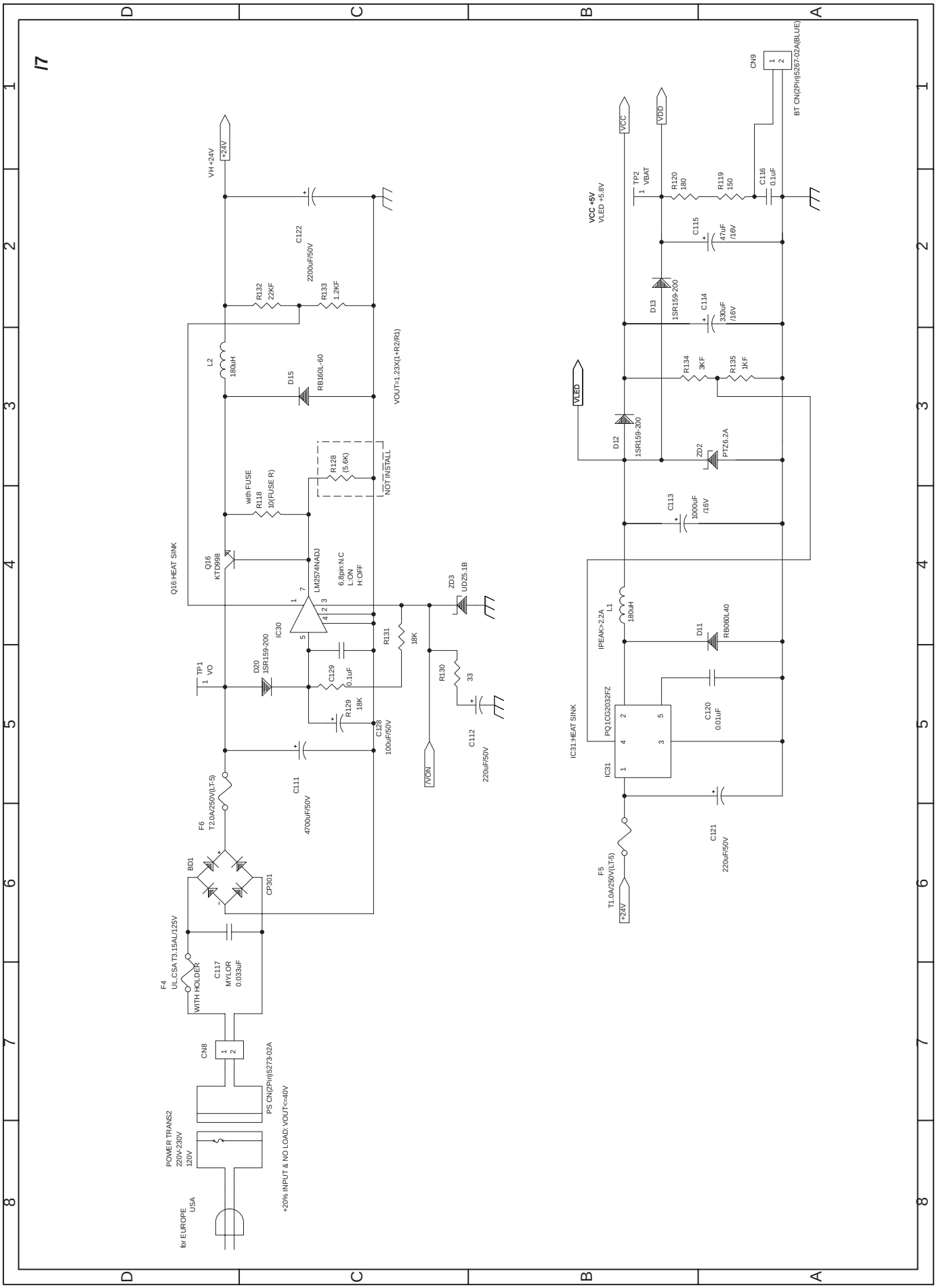
DRIVER PWB CIRCUIT

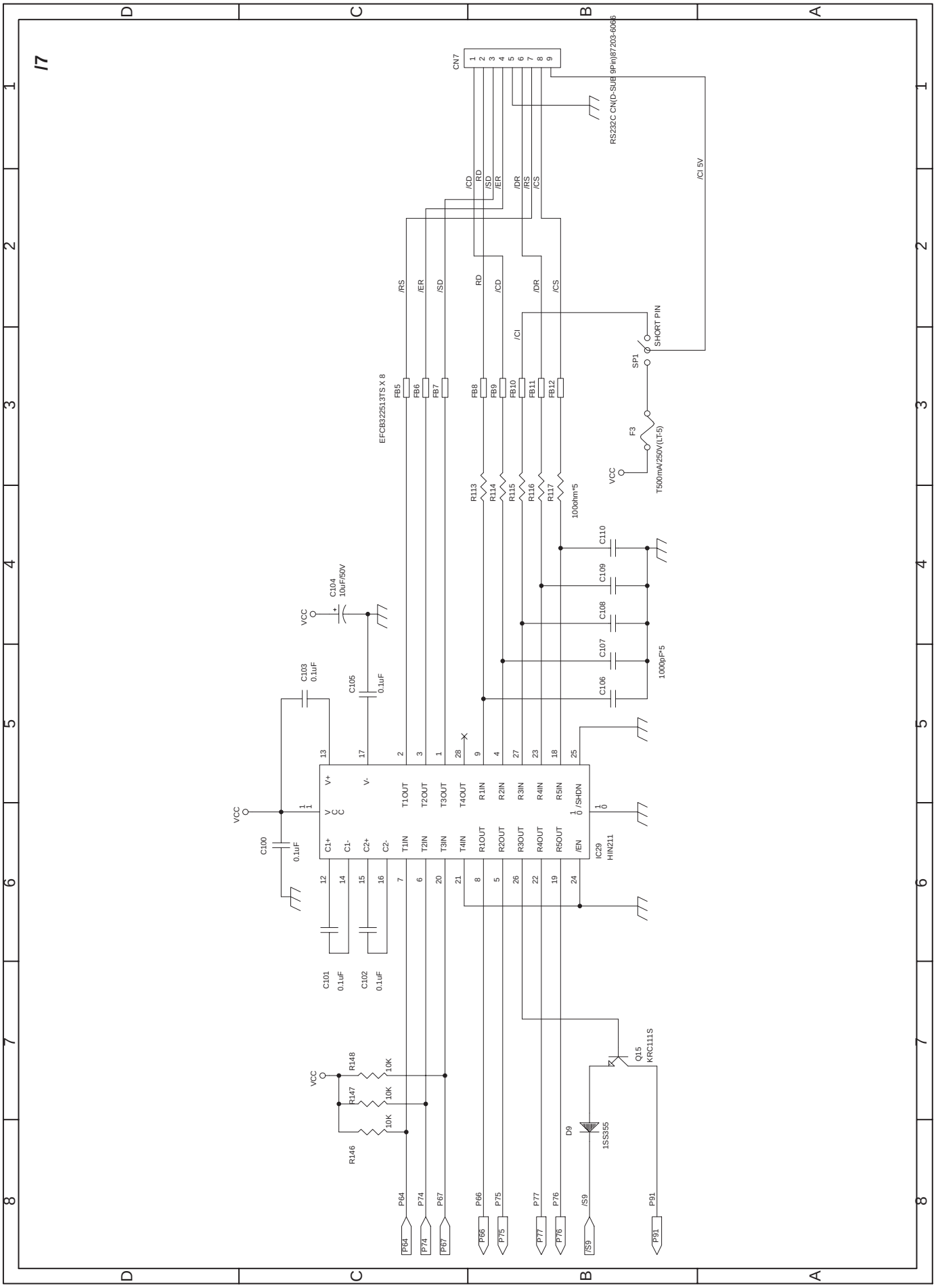
I7

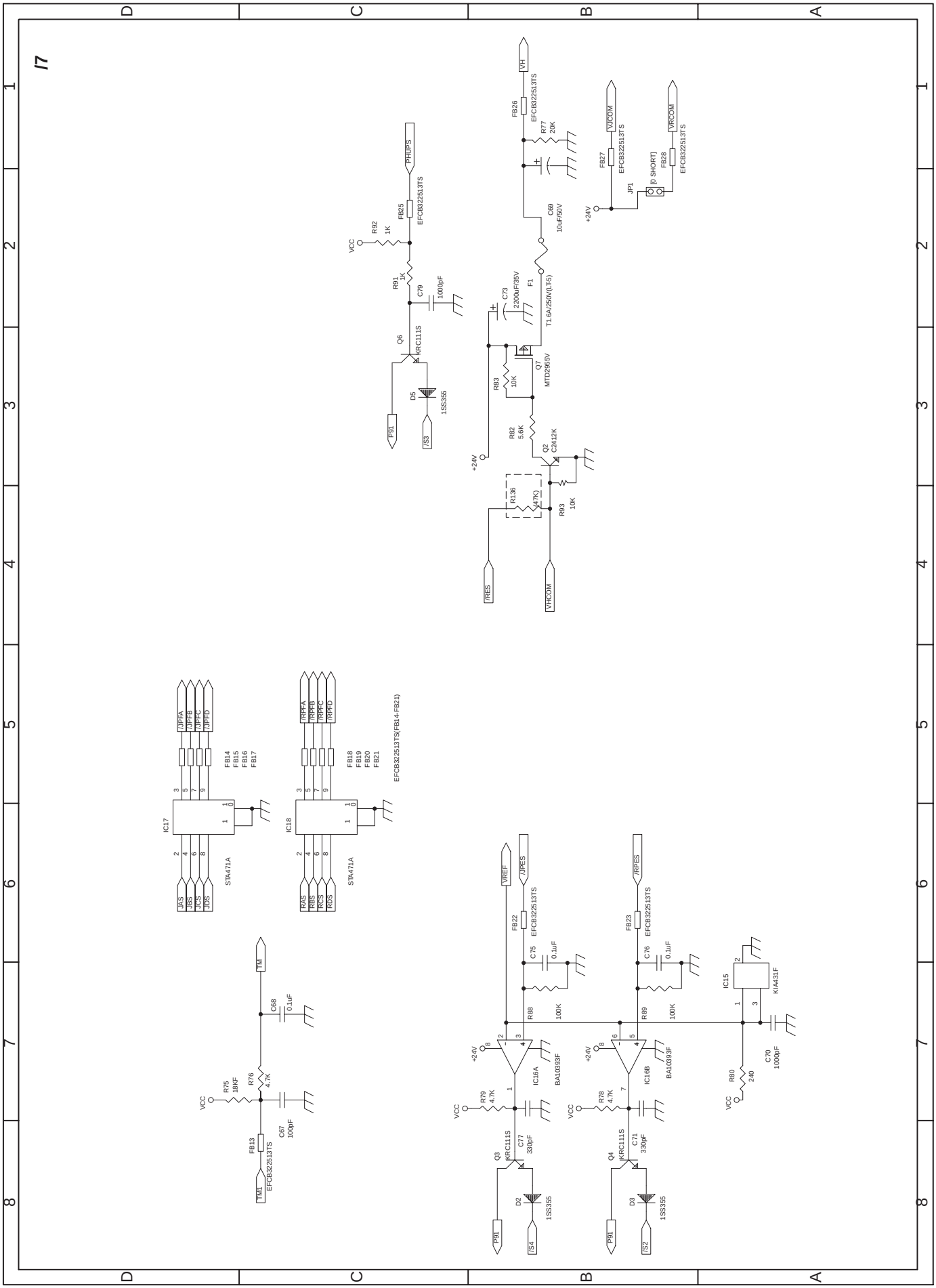


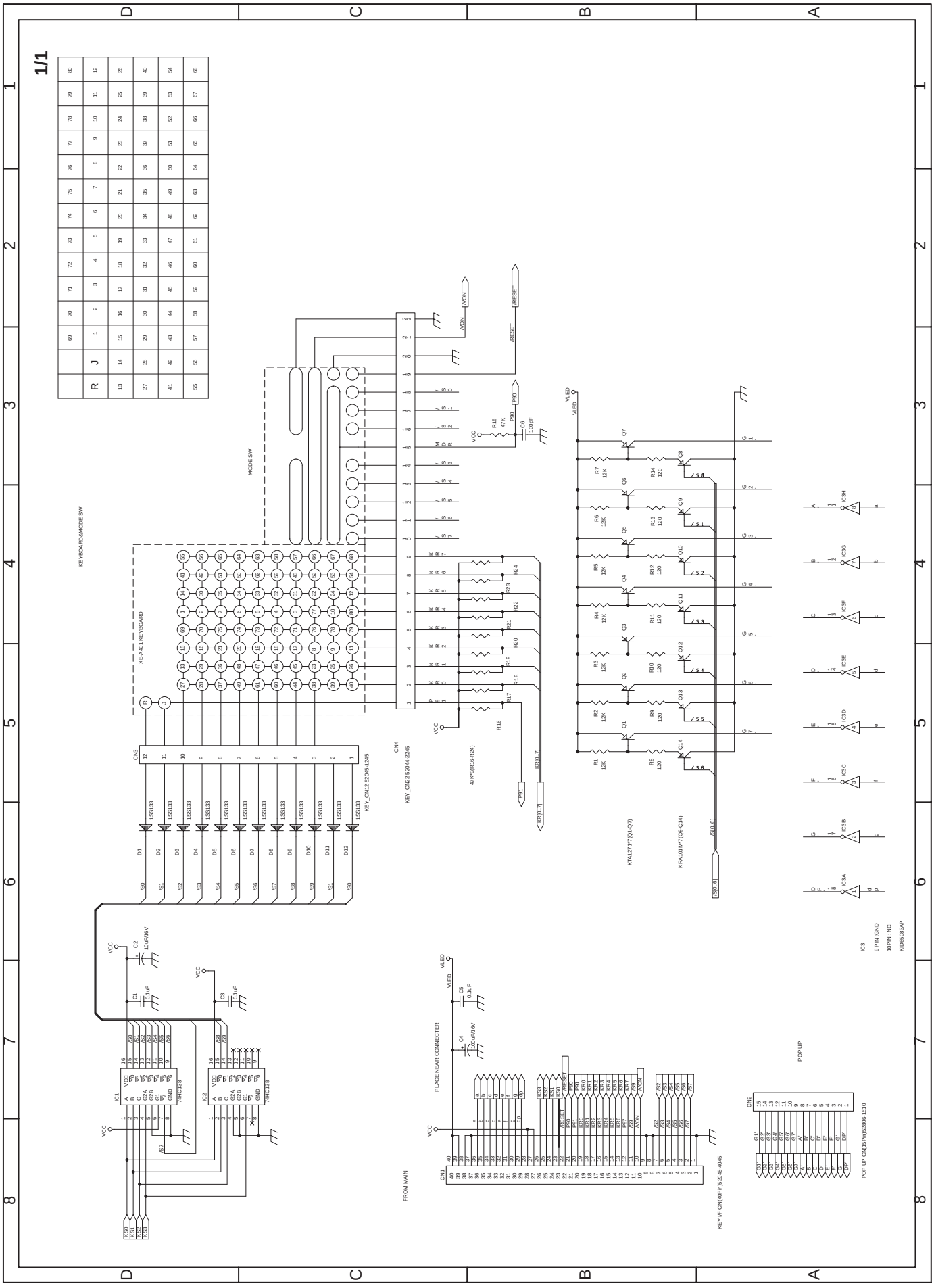

I7
C65
0.1uF
C64
10uF/50V
VCC
/RD
IC11
4M FLASH ROM LH28F004SUT-NC80
IC12
IC SOCKET (4M ROM)
C63
0.1uF
/WR
/RES
D[0..7]
A[0..19]
/RAMCS
R144
10K
C127
150pF
VDD
IC9A
IC9B
IC9C
74LV11A
*IC9 7Pin:VDD 14Pin:GND
C66
0.1uF
R150
10K
R142
10K
S1
1 ROM COPY
IPL SW SSS312
C126
0.1uF
IC13
74LV138A
R149
10K
BA0
BA1
/CS0
A19
IPLON
IC33D
74LV00A
*IC33 7Pin:VCC 14Pin:GND
/POFF
C119
1000pF
VLED
R127
2.7K
R126
56K
IC32A
BA10393F
IC32B
BA10393F
R124
10KF
R123
9.1KF
R125
6.2KF
C118
(1uF/50V)
+24V
R122
3.9K
ZD1
UDZ5.1B
P-OFF


I7
D
C
B
A
1
2
3
4
5
6
7
8
CN1
LCD CN(16Pin)5.4E0.16X
IC23
BA00ASFP
IC24
74HC138
IC25
74HC374
IC26
74HC245
IC27
74HC374
IC28
74HC245
Q11
KRC111S
D6
1SS355
C87
22uF/10VFX
C89
22uF/16V
C83
10uF/50V
C82
10uF/50V
C81
10uF/50V
C86
10uF/50V
C38
0.1uF
C39
0.1uF
C84
0.1uF
C85
0.1uF
C94
0.1uF
C90
100pF
C91
100pF
C92
100pF
C95
100pF
R100
5.6K
R102
2.4KF
R103
12K
R145
10K
R105
22K
R106
(4.7K)
R101
10K
R89
10K
R98
10K
R104
10K
VCC
VLED
RS
R/W
E
DB0..7
D0..7
KR0
KR1
KR2
KR3
KR4
KR5
KR6
KR7
KS0
KS1
KS2
KS3
A0
A1
A2
/CS3
/LE1
/LE2W
/LE3W
/LE4W


I7
VH +24V
+24V
C122
2200uF/50V
R132
22KF
R133
1.2KF
L2
180uH
D15
RB160L-60
VOUT=1.23X(1+R2/R1)
with FUSE
R118
10(FUSE R)
R128
(5.6K)
NOT INSTALL
Q16:HEAT SINK
Q16
KTD998
LM2574NADJ
6.8ph:N.C
L:ON
H:OFF
ZD3
UDZ5.1B
IC30
D20
1SR159-200
TP1
VO
R131
18K
C129
0.1uF
R129
18K
C128
100uF/50V
R130
33
C112
220uF/50V
/VON
C111
4700uF/50V
F6
T2.0A/250V(LT-5)
BD1
CP301
F4
UL,CSA T3.15AL/125V
WITH HOLDER
C117
MYLOR
0.033uF
CN8
PS CN(2Pin)5273-02A
POWER TRANS2
220V-230V
120V
for EUROPE
USA
+20% INPUT & NO LOAD: VOUT<=40V
VCC +5V
VLED +5.8V
TP2
VBAT
VCC
VDD
R120
180
R119
150
C116
0.1uF
CN9
BT CN(2Pin)5267-02A(BLUE)
C115
47uF
/16V
D13
1SR159-200
C114
330uF
/16V
R134
3KF
R135
1KF
VLED
D12
1SR159-200
ZD2
PTZ6.2A
C113
1000uF
/16V
IC31:HEAT SINK
IC31
PQ1CG2032FZ
IPEAK=2.2A
L1
180uH
D11
RB060L40
C120
0.01uF
C121
220uF/50V
F5
T1.0A/250V(LT-5)
+24V


I7
CN7
RS232C CN(D-SUB 9Pin)87203-6066
/CD
RD
/SD
/ER
/DR
/RS
/CS
/CI 5V
SHORT PIN
SP1
F3
T500mA/250V(LT-5)
VCC
EFCB322513TS X 8
FB5
FB6
FB7
FB8
FB9
FB10
FB11
FB12
R113
R114
R115
R116
R117
1000ohm*5
C110
C109
C108
C107
C106
1000pF*5
C104
10uF/50V
C103
0.1uF
C105
0.1uF
C100
0.1uF
C101
0.1uF
C102
0.1uF
IC29
HIN211
V+
V-
VCC
C1+
C1-
C2+
C2-
T1OUT
T2OUT
T3OUT
T4OUT
R1IN
R2IN
R3IN
R4IN
R5IN
/SHDN
T1IN
T2IN
T3IN
T4IN
R1OUT
R2OUT
R3OUT
R4OUT
R5OUT
/EN
R148
R147
R146
10K
Q15
KRC111S
D9
1SS355
/S9
P64
P74
P67
P66
P75
P77
P76
P91

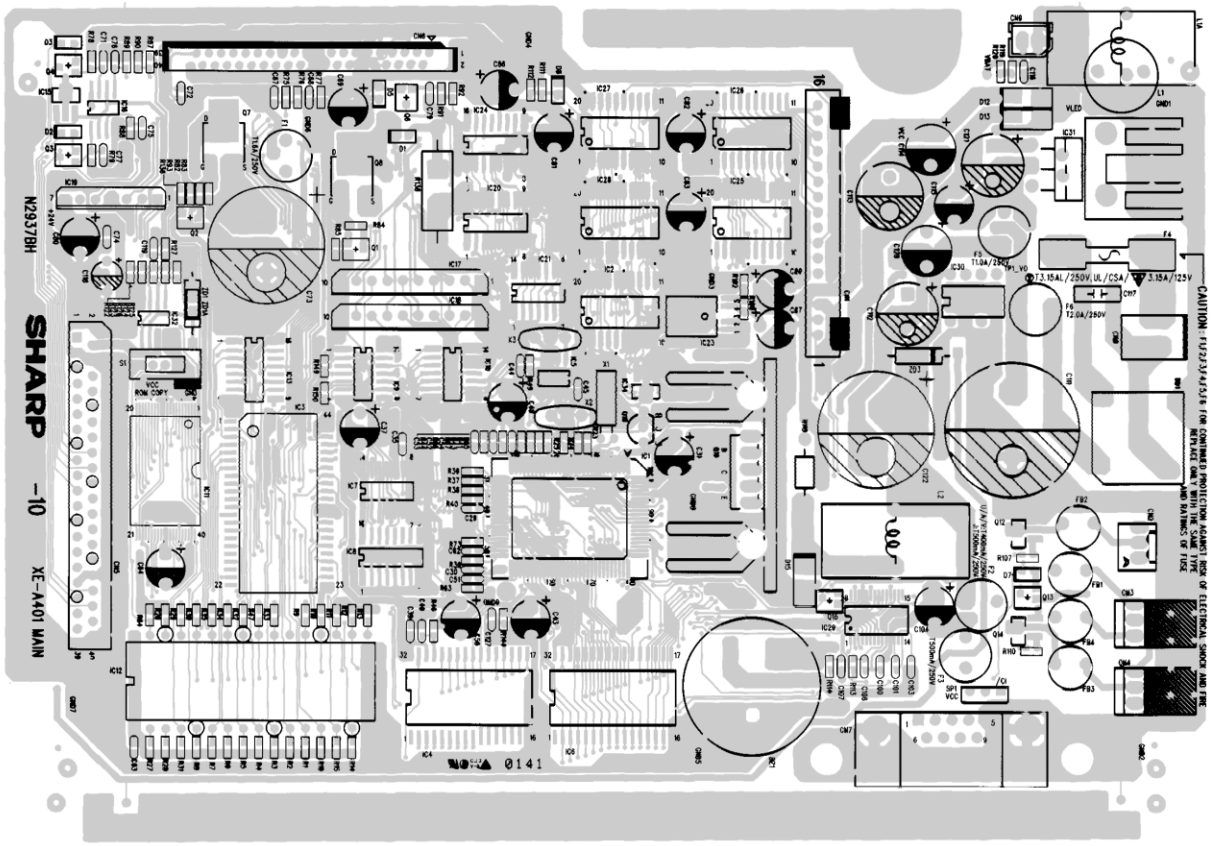

I7
VH
FB26
EFCB322513TS
R77
20K
C69
10uF/50V
VJCOM
FB27
JP1
[] SHORT]
FB28
VRCOM
+24V
PHUPS
FB25
R92
1K
VCC
R91
1K
C79
1000pF
Q6
KRC111S
D5
1SS355
P91
/S3
C73
2200uF/35V
F1
T1.6A/250V(LT5)
Q7
MTD2955V
R83
10K
R82
5.6K
Q2
C2412K
R136
(47K)
R93
10K
/RES
VHCOM
/JPFA
/JPFB
/JPFC
/JPFD
FB14
FB15
FB16
FB17
IC17
STA471A
JAS
JBS
JCS
JDS
/RPFA
/RPFB
/RPFC
/RPFD
FB18
FB19
FB20
FB21
IC18
STA471A
RAS
RBS
RCS
RDS
EFCB322513TS(FB14-FB21)
TM
C68
0.1uF
R75
18KF
R76
4.7K
VCC
C67
100pF
FB13
TM1
EFCB322513TS
VREF
/JPES
FB22
EFCB322513TS
C75
0.1uF
R88
100K
/RPES
FB23
EFCB322513TS
C76
0.1uF
R89
100K
IC15
KIA431F
R80
240
C70
1000pF
+24V
IC16A
BA10393F
R79
4.7K
Q3
KRC111S
C77
33pF
D2
1SS355
/S4
IC16B
BA10393F
R78
4.7K
Q4
KRC111S
C71
33pF
D3
1SS355
/S2


1/1
KEYBOARD&MODE SW
XE-A401 KEYBOARD
MODE SW
CN4
KEY_CN2 5204S-1245
KEY_CN23 5204S-2246
47K*9(R16-R24)
PLACE NEAR CONNECTER
FROM MAIN
KEY I/F CN1 40Pin FB30-40-40-45
CN1
CN2
POP UP CN13 Pin(s)23806-1510
POP UP
IC1
IC2
IC3
74HC139
VCC
VLED
VKON
RRESET
KS0.7
KR0.7
KS0.6
KRA101M*7(Q8-Q14)
KTA1271*7(Q1-Q7)
9 PIN : GND
10 PIN : NC
K6D6C8E3AP

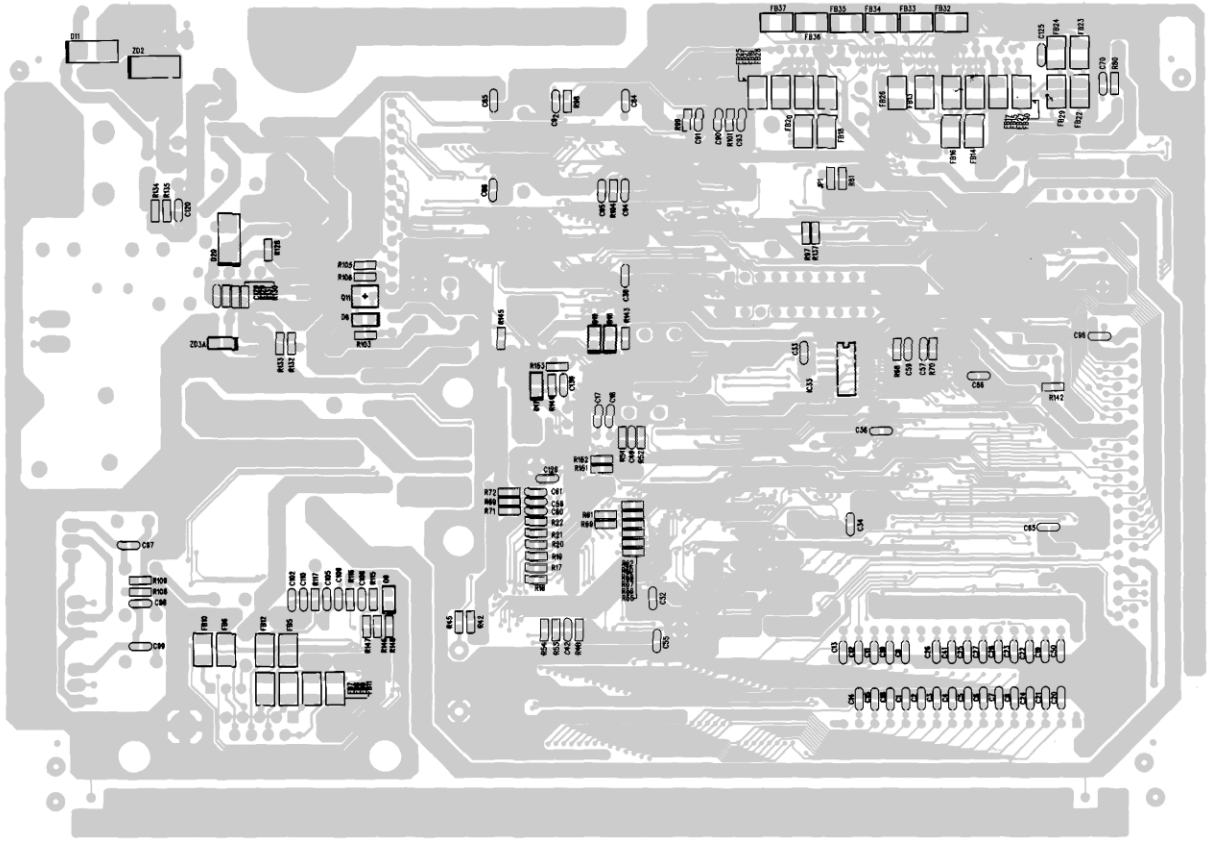
PWB LAYOUT

1. MAIN PWB LAYOUT

A. side



B. side



SHARP

COPYRIGHT © 2004 BY SHARP CORPORATION

All rights reserved.
Printed in Japan.
No part of this publication may be reproduced,
stored in a retrieval system, or transmitted.
In any form or by any means,
electronic, mechanical, photocopying, recording, or otherwise,
without prior written permission of the publisher.

SHARP CORPORATION
Digital Document Systems Group
Products Quality Assurance Department
Yamatokoriyama, Nara 639-1186, Japan
2004 March Printed in Japan ⓣ